**Section 370.840 Aerobic Sludge Digestion**

a) General

The aerobic sludge digestion system shall include provisions for digestion, supernatant separation, sludge concentration and any necessary sludge storage. These may be accomplished with separate tanks or processes or in digestion tanks.

b) Multiple Units

Multiple digestion units capable of independent operation are recommended for all plants and shall be provided in those plants where the design average flow exceeds 100,000 gallons per day. Plants without multiple units shall provide alternate sludge handling and disposal methods.

c) Tank Capacity

1) The following digestion tank capacities are based on a solids concentration of 2 percent with supernatant separation performed in a separate tank. If supernatant separation is performed in the digestion tank, a minimum of 25 percent additional volume is required. These capacities shall be provided unless sludge thickening facilities (refer to Section 370.820) are utilized to thicken the feed solids concentration to greater than 2 percent. If such. thickening is provided, the digestion volumes may be decreased proportionally.

|  |  |
| --- | --- |
| (ft.(3)/Population |  |
| Sludge Source | Equivalent (P.E.)) |
|  |  |
| Waste activated sludge-no primary settling |  |
| 4.5\* |  |
|  |  |
| Primary plus waste activated sludge |  |
|  | .0\* |
|  |  |
| Waste activated sludge exclusive of primary sludge |  |
|  | .0\* |
|  |  |
| Extended aeration activated sludge |  |
|  | .0 |
|  |  |
| Primary plus fixed film reactor sludges |  |
|  | .0 |

\*These volumes apply to waste activated sludge from single stage nitrification facilities with less than 24 hours detention time based on design average flow.

2) These volumes are based on digester temperatures of 59~ F (15~ C) and a solids retention time of 27 days. Aerobic digesters shall be covered to minimize heat loss or these volumes shall be increased for colder temperature applications. Refer to subsection (g) below for necessary sludge storage. Additional volume may be required if the land application disposal method is used in order to meet applicable Federal regulations.

d) Mixing

Aerobic digesters shall be equipped with devices which can maintain solids in suspension and which provide complete mixing of the digester contents.

e) Air Requirements

Sufficient air shall be provided to keep the solids in suspension and maintain dissolved oxygen between 1 and 2 milligrams per liter (mg/l). For minimum mixing and oxygen requirements, an air supply of 30 cfm per 1000 cubic feet of tank volume shall be provided with the largest blower out of service. If diffusers are used, the nonclog type is recommended, and they should be designed to permit continuity of service. If mechanical turbine aerators are utilized, at least two turbine aerators per tank shall be provided to permit continuity of service. Mechanical aerators are not acceptable for use in aerobic digesters due to freezing conditions experienced throughout Illinois.

f) Supernatant Separation and Scum and Grease Removal

1) Supernatant Separation

Facilities shall be provided for effective separation or decanting of supernatant. Separate facilities are recommended; however, supernatant separation may be accomplished in the digestion tank if additional volume is provided, in accordance with subsection (c) above. The supernatant drawoff unit shall be designed to prevent the recycle of scum and grease back to plant process units. Provision should be made to withdraw supernatant from multiple levels of the supernatant withdrawl zone.

2) Scum and Grease Removal

Facilities shall be provided for the effective collection of scum and grease for final disposal and to prevent recycle back to plant process units and prevent long term accumulation and potential for discharge of scum and grease in the effluent.

g) High Level Emergency Overflow

An unvalved high level overflow and any necessary piping shall be provided to return digester overflow back to the head of the plant or to the aeration process in case of accidental overfilling. The design of the overflow shall take into account the length of time and rate at which sludge is wasted during periods when the treatment plant is unattended, potential effects of overflow on plant process units, location of the discharge from the emergency overflow, and the potential for discharge of suspended solids in the plant effluent.

h) Digested Sludge Storage Volume

1) Sludge storage must be provided in accordance with Section 370.870 to accommodate daily sludge production volumes and as an operational buffer for unit outage and adverse weather conditions. Designs utilizing increased sludge age in the activated sludge system as a means of storage are not acceptable.

2) Liquid sludge storage capacity shall be based on the following values unless digested sludge thickening facilities are utilized (refer to Section 370.173) to provide solids concentrations to greater than 2 percent.

|  |  |
| --- | --- |
| Sludge Source | Volume (ft.(3)/P.E./day) |

(Source: Amended at 21 Ill. Reg. 12444, effective August 28, 1997)